ExamPath

CLASS 9 MATHEMATICS · FBISE · UNIT 3

Unit 3: Sets and Relations — Exam Ready

25 multiple-choice questions Suggested time: **25 minutes** 1 mark each

Name: Date: Score: / 25

Circle one answer for each question. The answer key with explanations is on the last pages, so try every question before you check. These are practice questions, not official FBISE papers.

1. The ordered pairs (a, b) and (c, d) are equal if:

(A) a = b and c = d
(B) a = d and b = c
(C) a + b = c + d
(D) a = c and b = d

2. If A = {0, 1, 2} and B = {3, 4}, find n(A × B) + n(B × A).

(A) 12
(B) 6
(C) 5
(D) 36

3. If A ⊂ B, what is A ∩ B?

(A) A ∪ B
(B) φ
(C) B
(D) A

4. If n(A) = 4 and n(B) = 3, how many binary relations are in A × B?

(A) 2^{12}
(B) 7
(C) 2^{7}
(D) 12

5. Which letter is used for the set of integers?

(A) Z
(B) Q
(C) N
(D) W

6. Which is the set builder form of the rational numbers?

(A) {x | x ∈ N}
(B) {x | x ≠ p/q}
(C) {p/q | p, q ∈ Z and q ≠ 0}
(D) {p/q | p, q ∈ Z and q = 0}

7. The intersection of A and B is written as:

(A) A ∪ B
(B) A′
(C) A ∩ B
(D) A − B

8. Find the range of R = {(x, x^2) | x is a prime number less than 13}.

(A) {2, 3, 5, 7, 11}
(B) {4, 9, 25, 49}
(C) {1, 4, 9, 25, 49, 121}
(D) {4, 9, 25, 49, 121}

9. Which statement about the empty set φ is correct?

(A) It has no elements
(B) It is the universal set
(C) It has infinitely many elements
(D) It has one element, 0

10. The domain of a relation R is the set of:

(A) all elements of A × B
(B) common elements of A and B
(C) second elements of its ordered pairs
(D) first elements of its ordered pairs

11. Let R = {(a, b) | a, b ∈ Z and a + b = 0}. Which statement is correct?

(A) Dom R ⊂ Range R
(B) Dom R = Range R
(C) Range R ⊂ Dom R
(D) Dom R and Range R are disjoint

12. Which pair of sets is overlapping?

(A) {1, 2, 3} and {4, 5}
(B) {1, 2, 3} and {1, 2, 3}
(C) {2, 3, 5, 7, 9} and {0, 3, 5, 8}
(D) {1, 2} and {1, 2, 3}

13. In a Venn diagram, the universal set is usually shown by:

(A) a point
(B) a line
(C) an arrow
(D) a rectangle

14. A binary relation R from A to B is:

(A) a subset of A × B
(B) the union of A and B
(C) a subset of A only
(D) any single element of A

15. If A = {a, b, c} and B = {a, b, c, d, ...}, how are A and B related?

(A) A and B are overlapping
(B) A ⊂ B, since every element of A is in B
(C) B ⊂ A
(D) A and B are disjoint

16. Which set is written in tabular form?

(A) {1, 2, 3}
(B) N less than 4
(C) The set of natural numbers less than 4
(D) {x | x ∈ N, x < 4}

17. If A ∩ B = φ, how does n(A ∪ B) compare with n(A) + n(B)?

(A) It equals n(A) × n(B)
(B) It is greater than n(A) + n(B)
(C) It equals n(A) + n(B)
(D) It is less than n(A) + n(B)

18. Which statement is true for any set A?

(A) A ∩ φ = A
(B) A ∩ A = A
(C) A ∪ A = φ
(D) A ∪ φ = φ

19. For $R = \{(0, 0), (2, 4), (3, 9)\}$, which statement about R^{-1} is correct?

(A) $R^{-1} = R$
(B) Range R^{-1} = Range R
(C) Dom R^{-1} = Dom R
(D) Dom R^{-1} = Range R

20. If $(x, 3) = (2, y)$, what are x and y?

(A) $x = 3, y = 2$
(B) $x = 2, y = 3$
(C) $x = 3, y = 3$
(D) $x = 2, y = 2$

21. If $A = \{1, 3, 5\}$, $B = \{2, 4\}$ and $C = \{6, 7\}$, find $n(A \times (B \cup C))$.

(A) 6
(B) 12
(C) 24
(D) 9

22. If $A = \varphi$, what is $A \times B$?

(A) $A \cup B$
(B) $\{(0, 0)\}$
(C) φ
(D) B

23. For two overlapping sets, $n(A - B)$ is found by:

(A) $n(A) - n(A \cap B)$
(B) $n(A \cap B) - n(A)$
(C) $n(A) + n(B)$
(D) $n(B) - n(A)$

24. A relation with no ordered pairs, $R = \varphi$, is called a:

(A) inverse relation
(B) identity relation
(C) void relation
(D) universal relation

25. In a survey of 60 people, 25 watch channel A, 16 watch channel B and 4 watch both. How many watch A or B?

(A) 41
(B) 37
(C) 45
(D) 29

Answer key

Unit 3 · Exam Ready

1 D	**2** A	**3** D	**4** A	**5** A
6 C	**7** C	**8** D	**9** A	**10** D
11 B	**12** C	**13** D	**14** A	**15** B
16 A	**17** C	**18** B	**19** D	**20** B
21 B	**22** C	**23** A	**24** C	**25** B

Explanations

1. D. a = c and b = d
Two ordered pairs are equal when their first elements match and their second elements match.

2. A. 12
n(A × B) = 6 and n(B × A) = 6. The total is 12.

3. D. A
All elements of A are also in B, so the common elements are exactly the elements of A.

4. A. 2^{12}
n(A × B) = 4 × 3 = 12, so the number of relations is 2^{12}.

5. A. Z
N is natural numbers, W is whole numbers, Z is integers and Q is rational numbers.

6. C. {p/q | p, q ∈ Z and q ≠ 0}
Rational numbers are fractions p/q of integers with the denominator not zero.

7. C. A ∩ B
A ∩ B holds the elements that belong to both A and B.

8. D. {4, 9, 25, 49, 121}
The primes below 13 are 2, 3, 5, 7 and 11. Their squares are 4, 9, 25, 49 and 121, and these form the range.

9. A. It has no elements
The empty set has no elements at all. The set {0} is different, since it has one element.

10. D. first elements of its ordered pairs
Domain means the first elements. The range is the set of second elements.

11. B. Dom R = Range R
For every integer a there is the integer b = −a. So both the domain and the range are all of Z.

12. C. {2, 3, 5, 7, 9} and {0, 3, 5, 8}
The second pair shares 3 and 5, and neither set contains the other. The first pair is disjoint and the third is a subset case.

13. D. a rectangle
The interior of a rectangle stands for U. Other closed shapes inside it stand for subsets.

14. A. a subset of A × B
A binary relation is a set of ordered pairs taken from A × B.

15. B. $A \subset B$, since every element of A is in B
All elements of A are in B, and B has more elements. So A is a subset of B.

16. A. {1, 2, 3}
Tabular (roster) form lists the elements inside braces.

17. C. It equals n(A) + n(B)
Disjoint sets share nothing, so $n(A \cup B) = n(A) + n(B)$.

18. B. $A \cap A = A$
$A \cap A = A$ and $A \cup A = A$. Also $A \cup \varphi = A$ and $A \cap \varphi = \varphi$.

19. D. Dom R^{-1} = Range R
$R^{-1} = \{(0, 0), (4, 2), (9, 3)\}$. Its domain {0, 4, 9} is the range of R.

20. B. x = 2, y = 3
Match the positions: x = 2 and 3 = y.

21. B. 12
$B \cup C = \{2, 4, 6, 7\}$ has 4 elements. So $n(A \times (B \cup C)) = 3 \times 4 = 12$.

22. C. φ
With no element in A, no ordered pair can be formed. So $A \times B = \varphi$.

23. A. $n(A) - n(A \cap B)$
From all of A, remove the elements that are also in B.

24. C. void relation
The empty relation is called a void relation.

25. B. 37
$n(A \cup B) = 25 + 16 - 4 = 37$.

Free practice from ExamPath (exampath.org). You may print and share for study. Take this test online with a timer and instant checking at exampath.org.